Revised 12/02

CORRES. CONTROL INCOMING LTR NO.

00002 RF03

DUE DATE

ACTION

DIST.	LTR	ENC
BOGNAR, E.	X	X
CROCKETT, G.		
DECK, C. A.		
DEGENHART, K		
DIETER, T. J.		
DIETERLE, S. E.	X	X
FERRERA, D.W.	X	X
FERRI, M.S.		
GERMAIN, A. L.		
GIACOMINI, J. J.		
ISOM, J. H.		
LINDSAY, D. C.		
LONG, J. W.		
LYLE, J. L.		
MARTINEZ, L.A.	X	X
NAGEL, R. E.	X	X
NORTH, K.		
PARKER, A.M.		
POWERS, K.		
RODGERS, A. D.		
SHELTON, D.C.	X	X
SPEARS, M.S.		
TRICE, K.D.		
TUOR, N.R.		
WILLLIAMS, J. L.		
BUTLER, L.	X	X
FOSS, D.	X	X

COR. CONTROL	X	X
ADMN. RECORD	X	X
PATS/130		

Reviewed for Addressee Corres. Control RFP

1/9/03 Date lmg By

Ref. Ltr. #

DOE ORDER #

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Colorado Department of Public Health and Environment

December 30, 2002

Mr. Joe Legare
Assistant Administrator for Environment and Infrastructure
U.S. Department of Energy-RFFO
10808 Highway 93, Unit A
Golden CO 80401-8200

RE: 60% Conceptual Design for the Present Landfill Closure Cover

Dear Mr. Legare:

The Colorado Department of Public Health and Environment and the Environmental Protection Agency have reviewed this report. We have identified deficiencies which are enclosed for your inclusion into the next design document. We recognize that you are designating this a 60% design, however, major issues remain unaddressed, which include surface water regulatory issues associated with appropriate seep management, landfill gas impacts on vegetation, stability analysis, finalization of cover depth, and vegetation requirements. Please see the enclosures for additional details and specific comments on this document.

As we have included in previous correspondence, you have still not provided an analysis of the use of available data and lessons learned from the Rocky Mountain Arsenal and other applicable sites in lieu of employing test plots to demonstrate viability at the present landfill. You began to develop this approach in the White Paper entitled Update on Testing and Monitoring Requirements for Alternative Covers in the Western United States dated August 28,2001, however, the comments that we transmitted to you on this document have not been addressed to date. The demonstration that test plots are not necessary prior to constructing the alternative cover remains to be validated and documented. A more rigorous design and monitoring program (as if the entire cap is a test plot) must also be utilized and included in the design document if this approach is to be realized. This has yet to be demonstrated.

If you have any questions concerning these comments, please contact Carl Spreng (CDPHE) at 303-692-3358, Elizabeth Pottorff (CDPHE) at 303-692-3429 or Jean MacKenzie (EPA) at 303-312-6258.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator
Colorado Department of Public
Health and Environment

Tim Rehder
Rocky Flats Project Manager
Environmental Protection Agency

Attachments (2)

cc: Scott Surovchak, DOE
Dave Shelton, K-H
Lane Butler, K-H
Dyan Foss, K-H
Dan Miller, AGO
Susan Chaki, CDPHE
Steve Tarlton, CDPHE-RFOU
Administrative Record, T130G

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EPA REVIEW OF THE ENGINEERED COVER DESIGN FOR THE PRESENT LANDFILL, 60 PERCENT DESIGN SUBMITTAL ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE GOLDEN, COLORADO

GENERAL COMMENT:

1. The document is presented as a 60 percent design and states that in the development of the document several assumptions were made, and components of the design, plans and specifications are incomplete. Key areas include, but are not limited to the following:

- Finalization of the cover thickness, components and characteristics, placement methodology and specifications, quality assurance/quality control specifications and constructibility assessment;
- Finalization of vegetation specifications;
- Design of the system to protect vegetation from impacts of landfill gas;
- Stability analysis of the cover system and eastern slope of the landfill;
- Design of the inlet and outlet structures for the culverts; and
- Performance monitoring and reporting requirements.

Because the areas that are incomplete and were deferred are significant areas of the greatest concern, the document is considered to be less than a 60 percent design. It is anticipated that the key areas will be addressed in supplemental documentation submitted for review by the agencies, and discussed prior to the 90 percent design submittal.

SPECIFIC COMMENTS:

1. <u>Section 3.3.2, Pages 3-5 and 3-6</u>. This section discusses landfill gas flux impacts on the vegetation layer. This section reports the results of revised model studies that indicate the expected methane concentration will be about 13.1 parts per million. The model results do not appear to reflect the high methane gas concentration of about 10 to 50 percent (on the volume basis) actually measured in field studies conducted at the Present Landfill by Kaiser-Hill in September 2001, and reported in the conceptual design report prepared by Daniel B. Stephens & Associates. Because computer modeling using un-calibrated models can produce misleading results, this section should discuss the relationship between the previous field test results and the revised model studies results, and show how the field test information was used in the assessment of the revised model results reported in this section.

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2. Section 3.4.2.2.2, Pages 3-17 to 3-20. This section discusses the approach to borrow source characterization. The second paragraph on page 3-19 implies that testing a duplicate sample from a sample location is the same as testing two samples from different locations. This is not the case. The section should be revised to state that a testing frequency of one sample per 5,000 cubic yards will result in sampling from 30 locations for 150,000 cubic yards of fill.

3. Section 4.1.6, page 4-3, Section 4.8, page 4-33, Section 6.3, Page 6-2: This section discussed the proposed management of treated seep water. NPDES requires that any discharge into waters of the US be regulated **at the discharge point**, which in your proposal would be at the point it leaves the pipe from the landfill (not at the site boundary). **This must be clarified in future design documents.** Also, the analytes to be monitored must 1) include those that are required under your NPDES permit (page 9 of 49); 2) include all analytes/effluent characteristics as set forth in the effluent guidelines for hazardous waste landfills, found in 40 CFR 445.11; and 3) be analyzed on a monthly basis. These requirements also apply to any other seeps which exist from the landfill. These points must be clarified and reflected in future design documents.

   Also, in previous correspondence you have stated that "The requirement for a modification of the existing permit to include the passive leachate collection and treatment system outfall is waived by RFCA." Please provide further rationale to support this statement or delete it. Your proposed re-configuration of the seep system/landfill must be addressed and comply with regulatory requirements. An NPDES discharge permit would normally be required, however because this is a CERCLA action, a permit may not be needed, but equivalent requirements must be addressed through another mechanism. This **cannot be ignored** and must be reflected in future design documents. Specific discharge requirements must also be defined and discussed in future documents.

4. Section 4.1.8 Wetlands Protection, Page 4-4: The following sentence must be added to the first paragraph: Pursuant to NEPA objectives, the EO also directs agencies to include all practicable measures to minimize harm to wetlands (i.e., mitigation)(see Section 2 of EO 11990). Also, in paragraph 2, sentence two the word "may" needs to be replaced with "will" in reference to mitigation of jurisdictional wetlands.

5. Section 4.4.4.3.4.2, Pages 4-15 and 4-16. This section discusses the hydraulic characterization of the two layers in the model. The last sentence states that "model input parameters for the underlying gravel were obtained from the literature," thereby assuming that the characteristics of the biota barrier layer and the gravel layer described in the literature are the same. The basis for this assumption should be discussed.

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6. **Section 4.5, Pages 4-18 and 4-19**. This section discusses the biota barrier material. The second paragraph on page 4-19 states that recycled concrete from Rocky Flats decommissioning activities will be used as biota barrier material. Because recycled concrete must meet rigid specifications, the specification section should be quoted in this paragraph.

7. **Section 4.7.2, Pages 4-21 to 4-24**. This section discusses settlement of the proposed cover. The first paragraph on page 4-24 indicates that the cover material will be placed in one 4-foot lift. Previous experience indicates that to achieve uniform density and hydraulic characteristics in the cover, lift thickness should not exceed 18 inches. This section should be revised to limit the lift thickness to 18 inches.

8. **Section 4.7.5.1, Page 4-30**. This section discusses soil erosion. Paragraph 3 states that the design erosion rate is 4.5 tons per acre per year. This is inconsistent with the design criteria on page 2-0. This paragraph should be revised to state that the erosion rate should not exceed 2 tons per acre per year.

9. **Attachment 2, Specification Section 02200**. This section discusses a test pad program to establish acceptable procedures for placement of soils in conformance with specifications. The basis for some of the requirements in the section is not clear and the requirements are vague.

   For example, Article 3.06 E states "Do not place materials with a moisture content less than optimum as defined by ASTM D1557 ...." It is not clear why ASTM 1557 was specified.

   Article 3.07 A refers to minimum Proctor density of 85 percent. It is not clear if this is standard or modifed Proctor. Also, Article 3.07 B refers to a density greater than "density created by....seed bed preparation." The density created by seed bed preparation is unspecified.

   Article 3.08 B 3 a refers to "... 1,000 square feet liftoff the assessment pad structure." This is unclear and should be corrected.

   In general, these specifications are vague and the rationale for selecting the specified moisture content and density are not discussed. Section 02200 should be clarified and the basis for the specified procedures and requirements should be discussed in the text of the document.

10. **Attachment 2, Specification Section 02222**. This section discusses the biota barrier. Article 2.01 A 5, page 02222-3 states "No specific rock type is specified, assuming all local rock sources should comply." This statement is all encompassing, is probably invalid, and should therefore be deleted. Language (similar to Section 02225 Article 2.01 B, first sentence) which refers to "rock that is hard, durable, dense, resistant to weathering, and free of structural defects" should be inserted in this article.

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Article 2.01 A 6, page 02222-3 states "Barriers deemed susceptible to freeze/thaw degradation should be placed below the estimated frost penetration depth." Because materials susceptible to freeze/thaw should not be used as biota barrier material, this article should be deleted.

Article 3.02 C, page 02222-4 indicates that quality control shall be based on "a visual field gradation test." The test procedure should be described in this section.

11. Attachment 2, Specification Section 02223. This section discusses cover material placement. Article 3.04 indicates that the procedure is intended to form a uniform thick soil mass of approximately 5.0 feet in thickness by placing the materials in a single lift. It is not clear if this is achievable. The detailed procedure to verify that the required layer thickness, density, and moisture conditions could be achieved should be specified in Attachment 2. Section 3.04 should be revised to indicate that material placement procedures will be specified after the results of the test pad program described in Specification Section 02200 are assessed.

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CDPHE COMMENTS
DESIGN OF AN ENGINEERED COVER FOR THE PRESENT LANDFILL
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
60% DESIGN SUBMITTAL
NOVEMBER 2002

General Comments

1. The Colorado Department of Public Health and Environment (CDPHE) has always maintained that the minimum thickness for the evapotranspiration (ET) cap planned for the Present Landfill must be 4-feet, no matter what results are obtained from computer modeling. We previously commented on this item as Comment 3 for the Conceptual Design. The response from K-H was that a 4-feet minimum cover thickness would be designed for the Present Landfill. This commitment has not been shown in the current design effort.

   The minimum 4-foot thickness must be designed exclusively for the material that acts as the soil water storage layer comprising the ET portion of the cap. Material that will be utilized for gradefill to achieve appropriate subgrade elevations cannot be considered part of the minimum 4-foot soil water storage layer thickness. Likewise, any material placed on the top of the ET cap to account for long-term soil loss must also be considered as an addition to the minimum 4-foot soil water storage layer thickness. CDPHE will not approve any design for an ET cap using a water storage layer less than 4-feet.

2. CDPHE requires that pan lysimeters, rather than column lysimeters, be utilized for measuring percolation through the cap for this project. The pan lysimeters should be similar to those used for the EPA's Alternative Cover Assessment Program (ACAP). The pan lysimeters should be installed prior to cap construction, and not after construction of the cap is complete, as currently planned. For full details on the design and installation of the pan lysimeters used in the ACAP program, please check the following web site:

   http://www.acap.dri.edu/TestSection/Test_Section_Installation_Instructions.doc

3. There are at least two different techniques to measure the suitability of the in-place soils of an ET cap with respect to compaction. The first method is to require a density range with respect to the maximum standard Proctor density (ASTM D-698). This is normally performed for most construction projects, where soils require high compaction for structural considerations, or for construction of low permeability barriers for landfills. Using this method, the *engineering* properties of the soils are evaluated and utilized for managing the quality of the placed soil. The second method, specific to promoting vegetative growth, is to measure the in-place soil bulk density and compare it to the "Growth-Limiting Bulk Density" (GLBD), as described by Daddow and Warrington, 1983[1]. Using this method, the *agricultural* properties of the compacted soils are evaluated with respect to the maximum allowable compaction that will not inhibit root

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growth. Either method may be acceptable for placement of an ET cap, however, the technique selected for use will dictate the testing requirements for both the borrow source characterization and density measurement of the in-place material. For this project, it appears that a combination of the two methods has been utilized, which is not correct.

Specifically, the potential borrow areas have been described, and material specifications developed, using USDA terminology. The specifications discuss the use of clay-loam or sandy clay-loam materials for the cover. However, the current soil compaction requirements are specified relative to standard Proctor compaction testing, which is an engineering measurement. If the standard Proctor compaction curve is used to measure the in-place density, then adequate engineering testing must be performed to assure that the materials are appropriate for use. The soils must be described, tested, and classified according to the Unified Soil Classification System (USCS). If the in-place bulk densities are tested and compared to the GLBD during cap placement, then the USDA terminology and associated textural triangle can be used.

Specific Comments

4. Preface, page P-ii, 3rd bullet – Please explain why the biota barrier will only be designed to prevent badgers from burrowing through the east slope of the cover. For long-term protectiveness, the biota barrier should be designed to deter both prairie dogs and badgers from the entire cover, including the top and all of the side slopes.

5. Section 3.4.2.2.1, page 3-17, 3rd bullet – We disagree with the statement that "...construction of an ET cover with bulk densities similar to those of an undisturbed soil may not be possible because of the compaction associated with landfill construction." It is our opinion that constructed soil densities similar to undisturbed soil densities can be achieved provided the appropriate means and methods are utilized during soil placement. The project designers should consider specifications that help keep the soil densities minimized during placement. For example, soil should be placed below the optimum moisture content, equipment and vehicles should be prohibited from travel on completed sections of the cap, and soil disking to loosen overcompacted soil should not be a standard project practice (the disking operation tends to compact lower lifts). A detailed work plan by the selected construction subcontractor must be required and approved by the designer, or a "method" rather than a "performance" specification should be considered in order to facilitate the cap placement to achieve appropriate soil densities.

6. Section 3.4.2.2.2, page 3-19, 1st par. – In addition to lab testing for soil texture, engineering soil classification testing (ASTM D-2487) should also be performed at an appropriate frequency. This will require that Atterberg limits (ASTM D-4318) be performed along with grain size analysis (ASTM D-422). It is also prudent to test for natural moisture content (ASTM D-2216) during this round of sampling.

7. Section 3.4.2.2.2, page 3-19, 2nd par. – 1) The minimum ET cap thickness should be

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4-feet, and not 3-feet as stated. Please see Comment 1. 2) The actual recommended minimum frequency from the guidance document is 1 sample per 5,000 m^3, and not 1 sample per 5,000 yd^3. The conversion from cubic meters to cubic yards is about 1 sample per 6,500 yd^3. However, split samples from the same location cannot be used to satisfy the minimum sampling frequency recommended by the guidance.

8. Section 4.2, page 4-4 – While CDPHE agrees in concept with the use of an ET cap for closing the Present Landfill, we also believe that traditional composite covers can be successful when used to cover landfills in Colorado. It is an overstatement to claim that a low permeable barrier cover "...has generally proven ineffective for arid and semi-arid regions such as Colorado...". Please modify this language accordingly.

9. Section 4.3, page 4-6, 1st bullet – CDPHE requires a minimum 4-feet of ET soil layer, rather than the 3-feet described. Please see Comment 1.

10 Section 4.4.4.2, page 4-14 – The wording is confusing. The ET portion of the cover (soil, not biota barrier) should have been consistently described as 3-feet in this design. However, since the minimum ET cap thickness will not be 3-feet but rather 4-feet, the wording for future design efforts should be modified to clearly describe the ET cap section.

11. Section 4.7.1, page 4-21, 3rd par. – For purposes of defining soft areas in the subgrade, the threshold should be 2-inches, and not 6-inches as currently described.

12. Section 4.7.2, page 4-23, 3rd par. – As previously stated, the minimum ET cap thickness should be 4-feet, exclusive of the material to be added for long-term erosion loss. Therefore, a final settlement calculation should be performed to reflect the thicker ET section.

13. Section 4.8, page 4-33, 1st par. – Please clarify what "low-permeability layer" is referred to in this paragraph.

14. Section 7.1.2.1, page 7-1 – This section describes monitoring equipment to be installed for the ET cap. It is CDPHE's position that only lysimeters will be utilized for compliance monitoring. The use of the other instrumentation described is not required by CDPHE, and should not be relied upon to either validate or refute the actual percolation to be measured by the lysimeters.

15. Section 7.1.2.2.3, page 7-3 – The lysimeters to be used for compliance monitoring must be pan lysimeters, and not column lysimeters, as previously stated in Comment 2.

16. Section 7.1.2.3, page 7-4 – While it is certainly the designer's option to calculate water flux rates through the cap using probes and other means, the only data CDPHE will accept for compliance monitoring will be the actual moisture collected in properly

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designed and constructed pan lysimeters.

17. Section 7.1.4, page 7-5 – The designers must be careful with the use of post-construction sampling. While it may be a useful tool to validate modeling or provide other constructive information, the additional sampling may also be used by the regulatory agencies to determine project compliance. If, for instance, soil densities are found to be outside of the approved specification, CDPHE will consider that a non-conformance with the project specifications, and may require additional information or investigations to determine the quality of the in-place cap.

Attachment 2 – Specifications

18. Section 01110, Part 1.01.A.6 – During proof rolling, areas showing deflection greater than 2-inches, rather than the 6-inches discussed in this specification, should be evaluated and repaired. Please see Comment 10.

19. Section 01110, Part 1.01.A.7 – Please remove the statement in this section concerning the objective of the "contractibility assessment" (assumed to be the test pad) to "...minimize compaction verification sampling and testing." Regardless of the results of the test fill and subsequent placement procedures, appropriate QC and QA sampling and testing must be performed at frequencies following accepted guidance or practice for constructing covers over hazardous waste facilities.

20. Section 01110, Part 1.01.A.8.b – The ET portion of the cover must be a minimum of 4-feet, not including the sacrificial erosion layer. See Comments 1 and 6. Also, similar to Comment 18, please remove the reference to "...minimize compaction verification sampling and testing".

21. Section 01440 – The referenced "Task-Specific Quality Assurance/Quality Control Plan" should be part of the design review process. In addition to a written description of the QC/QA requirements, a matrix or spreadsheet should be included which summarizes the specific QC/QA activity, the frequency of the activity, and the person or organization responsible for that activity. CDPHE requests that this document be transmitted to us as soon as possible so that we can provide input prior to the next iteration of the design.

22. Section 01720 – Additional information should be provided in this section. With respect to document etiquette, it should be clarified that all written field or lab data or information will be legible, complete, signed and dated. Blank spaces in forms should be identified as not applicable (N/A). Corrections should be shown with a single line drawn through the incorrect information, and must then be signed and dated.

23. Section 02200, Part 1.02.A – Construction Quality Assurance (CQA) should be performed by an independent Construction Quality Assurance Engineer (QCAE), and not by the construction subcontractor as stated. Please use Daniel and Koerner, 1993[2] for reference for QC and QA requirements.

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24. Section 02200, Part 3.06.E – The moisture content of the ET cap material should be less than the optimum moisture content, and not greater than optimum moisture content as stated. Also, it is unclear why ASTM D-1557 (modified Proctor density) is specified, rather than ASTM D-698 (standard Proctor density).

25. Section 02200, Part 3.07.A – The first sentence states that the fill shall be placed to the *minimum* density shown in the table. That statement should actually be the *maximum* density from the table. Also, the preponderance of information in the literature suggests that the GLBD, depending on soil texture, corresponds to densities from about 82% to 91% of the maximum standard Proctor density, with an average of about 84% (Goldsmith, et.al., 2001)[3]. Therefore, any specification for compaction of soils for the ET cap should be no greater than about 85% of the maximum standard Proctor density.

26. Section 02223, Part 1.04.A. – The CQAE should also approve the acceptable means and methods for placement of the ET cover materials.

27. Section 02223, Part 3.04.4 – How will all of the cobbles over three-inches be removed from the ET cap material? Will the material be screened? Will the entire thickness of the ET soil be evaluated for the cobbles, or just what can be visually detected during placement operations? Please provide further details.

28. Section 02223, Part 3.04.9 – Based on experience at the Rocky Mountain Arsenal and other sites, CDPHE strongly recommends that disking soils to loosen overcompacted areas be minimized. See Comment 5.

29. Section 02224 – CDPHE requires the use of pan lysimeters to measure percolation through the ET cap. Please see Comment 2.

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[1] Daddow, R.L. and Warrington, G.E. (1983). "Growth-Limiting Bulk Densities as Influenced by Soil Texture", WDG Report, WSDG-TN-00005, USDA Forest Service

[2] Daniel, D.E. and Koerner, R.M. (1993). "Quality Assurance and Quality Control for Waste Containment Facilities", EPA Technical Guidance Document, EPA/600/R-93/182.

[3] Goldsmith, W., Silva, M., and Fischenich, C. (2001). "Determining Optimal Degree of Soil Compaction for Balancing Mechanical Stability and Plant Growth Capacity", ERDC TN-EMRRP-SR-26, U.S. Army Research and Development Center, Vicksburg, MS

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